26.0 SITE 112
FENCED SALVAGE YARD
DSERTS NO. FGLY-060

According to the 1996 EBS, Site 112 was formerly a fenced salvage area with unknown storage practices (Woodward-Clyde 1996). Site 112 is located near the southwest terminus of Magnolia Road and encompasses approximately 1.2 acres.

The LRI for Site 112 was conducted to evaluate the impact to the surface and shallow subsurface soil resulting from former storage practices. The 1998 field activities comprised the first site work conducted at this parcel during the LRI program. A map of Site 112 is included as Figure 26-1.

26.1 SITE BACKGROUND

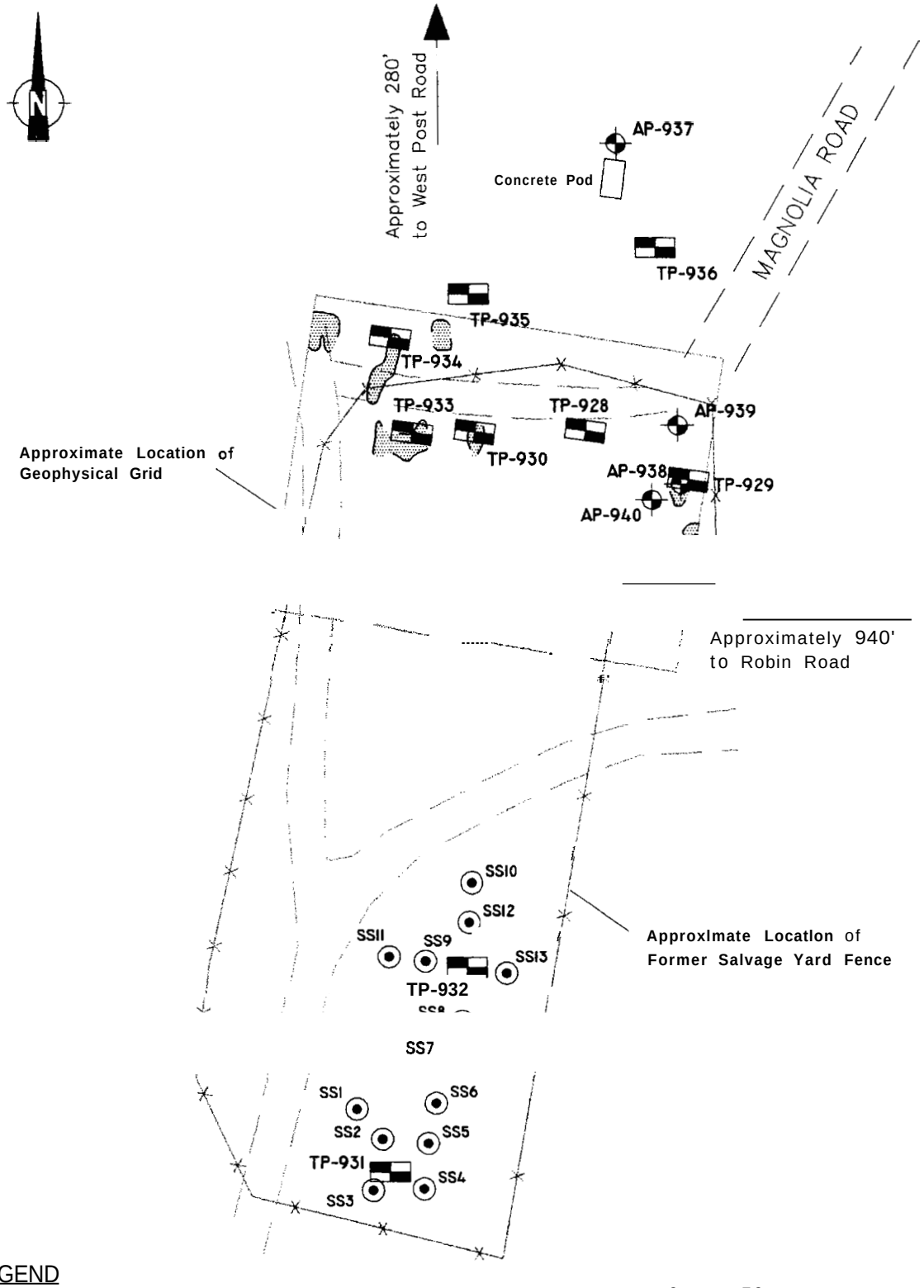
Based on review of a 1967 map, the EBS identified Site 112 as a fenced area used for storing unknown items from salvage activities. The initial site evaluation conducted on 30 June 1998 identified stained areas and noted abundant metallic debris scattered across the surface in the southern half of the site.

26.2 COPC SELECTION AND SAMPLE ANALYSIS

The LRI for Site 112 was conducted to evaluate the potential environmental impact resulting from the potential storage of diesel fuel, solvents, and pesticides in the former fenced salvage area. The project samples were therefore analyzed for VOCs, SVOCs, GRO, DRO, RRO, OCPs, PCBs, and metals.

26.3 FIELD ACTIVITIES

Field activities conducted during the 1998 LRI consisted of an initial site evaluation, excavating test pits, drilling soil borings, surface and subsurface soil sampling, and field screening. Nine test pits, four soil borings, and 13 soil surface samples were completed at



LEGEND

AP-937 — Approximate Location of Boring AP–937: Drilled July and September 1998

TP-928 — Approximate Location of Test Pit TP–928; Excavoled July 1998

SSI — Approximote Location of Surface Sample SS1; Collected September 1998

Approximote Location of Anomalies identifled in Arctic Geosciences, Inc's 1998 Geophysical Survey

0 50 100 200

APPROXIMATE SCALE IN FEET

SITE 112 SITE MAP
FORT GREELY, ALASKA

PROJ. MGR.:	ACAD FILE NO:	FIGURE NO.:
G. SNERSEN	S112	26–1
DRAWN BY:	PROJ. NO.:	DATE:
S&W, Inc	05M31002	APR. 1999

S112.dwg 1:100 Shannon & Wilson, Inc

Site 112. In addition, field surveys included a UXO clearance prior to invasive work, and a geophysical survey to identify potential subsurface anomalies indicative of buried metal objects or soil disturbances. Locations of test pits, soil borings, surface soil samples, and pertinent site features are shown on Figure 26-1, and photographs of field activities are included as Photographs 37 and 38 in Appendix A.

During the July 1998 initial site evaluation, surface staining, scrap metal, a potential burial trench, and a concrete pad were observed at Site 112. These observations were incorporated into the field decision process for determining survey boundaries and selecting sampling locations and analyses.

26.3.1 UXO Clearance

The initial UXO clearance for Site 112 was conducted by EcoMunition, Inc. on 16 through 21 July 1998, prior to invasive field activities. **A** large quantity of scrap metal was encountered during the surface survey, including expended smoke grenades, slap flares, and *5.56* mm blanks. UXO was not identified in the 1.2-acre survey area. Continuous UXO monitoring was conducted during the test pit and soil boring activities. UXO-related scrap was encountered in Test Pit TP-930. Items recovered consisted of a 155-mm illumination projectile, 2.75-inch rocket fin, and a SO-caliber link. Explosive Disposal Engineering and Technology conducted UXO clearance and monitoring on 8 through 10 September 1998 for the additional borings and surface samples. Surface sweeps were conducted during the first two days, and monitoring was conducted on the third day for the surface samples and three soil borings. Although a "big pile" of .50-caliber links was noted, no UXO were observed. The EcoMunition and Explosive Disposal Engineering and Technology reports are included in Appendix C as Attachment C-1.

26.3.2 Geophysical Survey

A geophysical survey was conducted by Arctic Geoscience, Inc. to investigate the presence of possible buried metallic debris and potential UXO. The survey utilized E-M and magnetic techniques, performed on a grid measuring 260 feet by 200 feet, with the long axis oriented

east-west. The grid was established in the northeastern portion of Site 112, based on the prevalence of scrap metal and surface stains in this area. If numerous or extensive geophysical anomalies were identified in this area, the grid would have been expanded to include a larger area. Because the initial survey identified only small, isolated anomalies, additional geophysical work was not conducted. Prior to conducting the survey, the site was cleared for UXO and surficial vegetation was removed. The E-M and magnetic data reflected widespread metallic debris in the surface soil, particularly in the northwest corners of the survey area. Subsurface anomalies were identified in the northwest comer and along the eastern boundary of the survey area. The subsurface anomalies exhibiting the highest combined conductive and electromagnetic responses are depicted on Figure 26-1. Details of the survey are presented in Appendix C as Attachment C-2.

26.3.3 Test Pits

Nine test pits were excavated on 20 and 21 July 1998 at the locations shown in Figure 26-1. Test Pits TP-928, TP-931, and TP-932 were located at areas with surface stains. Soil samples were collected at 0.5, 5, and 10 feet bgs in TP-928, and at 0.5, and 5 feet bgs in TP-931 and TP-932. Primary field screenings results ranged from 0 to 28 ppm, and the results of secondary headspace screening ranged from 1 to 600 ppm. The highest secondary screening results were associated with the surface samples from 0.5 foot bgs in each test pit. In the upper two feet of the test pits were metallic objects. In TP-928, the boring log refers to two objects as ordnance (UXO scrap); in the other two test pits, miscellaneous metal. Based on the screening results and project objectives, samples from 5 and 10 feet bgs in TP-928, and 0.5 and 5 feet bgs in TP-931 and TP-932, were selected for laboratory analysis.

Test Pits TP-929, TP-930, TP-933, and TP-934 were excavated to investigate geophysical anomalies. The test pit locations were selected to obtain representative data from the anomalous areas, with an emphasis on characterizing areas that generated the highest electromagnetic responses or were located within the former salvage yard boundaries. If these test pits had indicated diverse subsurface conditions, additional excavations would have been recommended to investigate the remaining anomalies.

Soil samples were collected at 0.5 foot and 4 feet bgs in TP-929, and at 0.5 foot and 5 feet bgs in TP-930, TP-933, and TP-934. Primary field screening results ranged from 0 to 0.8 ppm, and the results of secondary headspace screening ranged from 1 to 400 ppm. The highest secondary screening results were associated with the soil samples from 0.5 foot bgs in each test pit. With the exception of TP-930, the test pits contained abundant metallic objects, including scrap metal, cable, wire, drums and drum parts, and auto parts. Non-metallic objects included tires and wood timbers. Based on the screening results and project objectives, samples from 0.5 foot and 4 feet bgs in TP-929, and 0.5 foot and 5 feet bgs in TP-930, TP-933, and TP-934 were selected for laboratory analysis.

Test Pits TP-935 and TP-936 were located along a ditch/trench in the northern portion of the site. Soil samples were collected at 0.5 foot and 5 feet bgs. Primary field screening results ranged from 0.2 to 2 ppm, and secondary headspace screening results ranged from 1 to 40 ppm. No debris was encountered in the two test pits. Samples from 0.5 and 5 feet bgs in TP-935 and TP-936 were selected for laboratory analysis.

Soil from Test Pit TP-929 was placed in two super sacks; soil from Test Pit TP-935 was placed in six super sacks; and soil from TP-936 was placed in five super sacks. The excavations were backfilled with clean fill. Scrap metal associated with TP-929, TP-930, TP-933, and TP-934 was stockpiled.

26.3.4 Soil Borings

Four soil borings were drilled at Site 112 to penetrate the debris locally and to evaluate the extent of the contamination. One boring was in the original work plan. The additional borings were added in accordance with the field decision process, illustrated in Figure 3-1, to address observations from the initial site evaluation, field observations, and analytical results.

Soil Boring AP-937, drilled on 18 and 20 July 1998, was positioned in the northern half of the site, adjacent to a concrete pad with a sump. The location of this pad is shown in Figure 26-1. Samples were attempted at 5-foot intervals to a depth of 35 feet bgs. Primary field screening

results for these samples ranged from 0.8 to 1.3 ppm, and secondary heated headspace screening results ranged from 1 to 5 ppm. Samples from 5, 15, and 33 feet bgs were submitted for the full suite of COPC analyses.

Soil Borings AP-938, AP-939, and AP-940, drilled on 10 September 1998, were located to further investigate the occurrence of OCPs. Soil Boring AP-938 was drilled to a depth of 11.5 feet bgs adjacent to TP-928 in order to penetrate the debris. The primary field screening result for the one sample collected from this boring was 0.4 ppm, and the secondary headspace screening result was 5 ppm. The sample was submitted for OCP analysis.

AP-939 was drilled to a depth of 11.5 feet bgs, with samples collected at 0, 5, and 10 feet bgs. Primary field screening results ranged from 0.2 to 0.8 ppm. Secondary headspace screening was not conducted. Samples from 0 and 10 feet bgs were submitted for OCP analyses.

AP-940 was drilled to a depth of 11.5 feet bgs, with samples collected at 0, 5, and 10 feet bgs. Primary field screening results ranged from 0.4 to 0.6 ppm. Secondary headspace screening was not conducted. Samples from 0 and 5 feet bgs were submitted for OCP analyses.

Based on analytical results, soil generated during drilling was landspread.

26.3.5 Surface Soil Samples

Surface soil samples were collected at the locations shown on Figure 26-1. Thirteen samples, designated SS-1 through SS-13, were obtained to evaluate metals concentrations, specifically arsenic and chromium, in surface soil from areas around TP-931 and TP-932. The objective of this surface sampling was to further evaluate surface metals concentrations relative to background and project screening standards. Four surface samples were initially collected from around each test pit at a horizontal distance of about 25 feet. **A** second set of five surface samples was collected at a horizontal distance of 50 feet, unless restricted by the tree line to the south and east. The initial set of eight samples were submitted for arsenic and chromium analyses. The other five surface samples were not analyzed.

26.4 DATA ASSESSMENT

Soil samples from 34 discrete locations from test pits, soil borings, and surface samples were submitted for laboratory analyses, along with two samples for methanol blanks and three sets of QC/QA samples. The individual project and QC/QA samples were assigned sample identification numbers **112-001-SO** through **112-045-SO.** Results of the Site **112** laboratory analyses, including project and QC/QA samples, are presented in Table **26-1.**

26.4.1 COPC Analyses and Data Screening

Based on field screening results, indications of contamination were observed during activities at Site **112.** Laboratory results verified the presence of detectable GRO, DRO, RRO, VOCs, SVOCs, PAHs, OCPs, and metals in the Site **112** samples. PCBs were not detected.

Reported GRO concentrations range from non-detectable to **6.3** ppm, DRO concentrations ranged from non-detectable to **1,800** ppm, and **RRO** concentrations range from non-detectable to **9,800** ppm. The highest RRO and DRO levels are associated with **TP-935** and TP-936, respectively. Reported GRO, DRO, and RRO concentrations do not exceed project screening standards.

Reported VOC constituents detected in the samples include methylene chloride, toluene, trichloroethene, and xylenes. Reported VOC concentrations do not exceed project screening standards.

SVOC constituents detected in the samples include benzoic acid, chrysene, fluoranthene, fluorene, naphthalene, phenanthrene, pyrene, bis-(2-ethylhexyl)phthalate, and 2-methylnaphthalene. Reported SVOC concentrations do not exceed project screening standards; however, the RLs for some SVOC constituents exceed project screening standards.

TABLE 26-1 - SUMMARY OF SITE 112 SAMPLE ANALYTICAL RESULTS

18-21 July 1998 Sample Results

Parameter Tested	Screening Standardt (ppm)	Sample ID* and Depth in Feet: 112-004-SO TP-928 S2 5-5.5	12-004QC-SO TP-928 S2** 5-5.5	12-004QA-SO TP-928 S2*** 5-5.5	112-005-SO TP-928 S3 10-10.5
rimary Field Screening - ppm	NA	15	15	15	1
econdary Headspace Screening - ppm	NA	500	*500*	500	1
)iesel Range Organic Compounds (DRO) - ppm	5,000	990	1.700	1,200	ND [8.2]
esidual Range Organic Compounds (RRO) - ppm	10,000	420	700	130	ND [200]
iasoline Range Organic Compounds (GRO) - ppm	1,400	ND [4 9]	ND [6 1]	1.1	ND [7.2]
'olatile Organic Compounds (VOC) - ppm					
Methylene Chloride - ppm	2 1	0 049 J	0 047 J	ND (0.18]	0.095
Other VOCs - ppm	NA	ND	ND	ND	ND
emivolatile Organic Compounds (SVOC) - ppm					
Benzoic acid - ppm	43,600	ND [0 17] J	1 J	ND [0.85]	0.34 5
Phenanthrene - ppm		ND [0 17]	0 089 J	ND [0.85]	ND [0.17]
Other SVOCs - ppm	NA	ND	ND	ND	ND
)rganochlorinated Pesticides (OCP) - ppm					
4,4'-DDD - ppm	1.9	ND [0 0007	ND [0 0007]	0.0052	ND [0.0007]
4,4'-DDE - ppni	1 3	ND [0 0007	ND [00007]	ND [0.0034]	0.0002 J
4,4'-DDT - ppm	**1 3**	0013	ND [00007]	0.017	0.0007
Endosulfan I - ppm	390	0 0031	ND [0 00071	ND [0.0017]	ND [0.0007]
Endosultan II - ppm	390	0 0055	0 0029	ND [0.0034]	ND [0.0007]
alpha-BHC - ppm	0 071	0 0046	0 0026	ND [0.0017]	ND [0.0007]
beta-BHC - ppni	0 25	0 0053	ND [0 0007]	ND [0.0017]	ND [0.0007]
Other OCPs - ppni	**NA**	ND	ND	ND	ND
'olychlorinated Biphenyls (PCB) - ppm	NA	ND	ND	ND	ND
'otal Metals - ppm					
Aluminum - ppm	77,000	8,000	8,430	3,000	5,370 5
Antimony - ppm	31	0 46 5	0 45 1	ND [2.6]	0.88 5
Arsenic - ppm	22 *6*	6 7	10	5	6.4
Barium - ppm	5,300	64 3	71 2	46	57.4
Beryllium - ppm	0 14	0 0474 J	0 0521	ND [0 26]	ND [0.512]
Calcium - ppm		3,000	2.210	1,100 J	3,140
Chromium - ppni	30	**50.4** [3]	15	6.1	13.7
Cobalt - ppni	4,600	5 88	6 4	3.3	4.89 J
Copper - ppni	2,800	18 7	27 6	14	20.8 J
Iron - ppm		12.400	13.000	6,800	10.300 J
Lead - ppm	100	**6 1 5**	6 2 1	5.6	ND [10]
Magnesium - ppm		5,120	2 830	1,800 J	2,970
Manganese - ppm	3,200	235	235	180 J	207 J
Mercury - ppm	290	ND [0 1]	ND [0 1]	ND [0.098]	0.07 J
Nickel - ppm	1,500	51	16 2	8.9	18.4
Potassium - ppm		976	941	650 J	867
Selenium - ppm	380	0 24 1	0.42 [a] J	ND [0.27]	0.35 [a] J
Sodium - ppm		162 J	178 5	59	164 J
Vanadium - ppni	540	21 7	20 6	12	18.4
Zinc - ppni	23.000	24 1	24 9 5	17	20.6 J
Other Metals - ppm	NA	ND	ND	ND	ND

dote This table lists only the detected constituents r the VOC, SVC . OCP. and metals analyses
Full analytical reports, including laboratory RLs, are contained in Appendix F

TABLE 26-1 - SUMMARY OF SITE 112 SAMPLE ANALYTICAL RESULTS

(Contin 1)

18-21 July *1998* Sample Results

Parameter Tested	Screening Standardt (ppm)	ample ID* a 112-006-SO TP-929 S1	Depth in Feet 112-007-SO TP-929 S2	112-008-SO TP-930 S1	112-009-SO TP-930 S2
		0-0 5	4-4.5	0-0 5	5-5.5
Primary Field Screening - ppm	NA	0 8	0.2	0 8	0.5
Secondary Headspace Screening - ppm	NA	50	10a	20	1
Diesel Range Organic Compounds (DRO) - ppm	5,000	200	79	33	ND [8.1]
Residual Range Organic Compounds (RRO) - ppm	10,000	1,200	520	700	ND [200]
Gasoline Range Organic Compounds (GRO) - ppm	1,400	ND [6 2]	5.1J	ND [10]	ND [4.9]
Volatile Organic Compounds (VOC) - ppm					
Methylene Chloride - ppm	2 1	0 086 J	0.057 J	0 096 J	0.036 J
Toluene - ppm	437	ND [02]	ND [0.14]	0.012 J	ND [0.11]
Trichloroethene - ppni	3 2	ND [02]	ND [0.14]	0 039 J	ND [0.11]
Other VOCs - ppm	NA	ND	ND	ND	ND
		ND [0 19]	ND [0.18]	0.12 J	ND [0.17]
	43,600	1 5 J	0.78 J	0 87 J	0.13 J
	2,600	ND [0 19]	0.025 J	ND [0 19]	ND [0.17] J
	90	ND [0 19]	ND [0.18]	0.013 J	ND [0.17]
	240	ND [0 19]	ND [0.18]	0 036 J	ND [0.17]
		ND [0 19]	ND [0.18]	0085 J	ND [0.17]
	100	0022 J	0.025 J	0 014 J	ND [0.17]
	32	0065 J	ND [0 18]	ND [0 19]	ND [0.17]
	NA	ND	ND	ND	ND
	1.9	**36** [a]	**3.6** [a]	0 0038	ND [0.0007]
	1 3	**3.1** [a]	0.52	0 003	ND [0.0007]
	1.3	**87** [a,4]	**11** [a,4]	0 02	ND [0.0007]
	390	ND (0 0008]	ND [0.0007]	0 0008	ND [0.0007]
	NA	ND	ND	ND	ND
	NA	ND	ND	ND	ND
Total Metals - ppm					
Aluminum - ppin	77,000	12,900	9,590	14,400	9,040
Antimony - ppni	31	2 4	2	1.5	0.27 J
Arsenic - ppm	22 6	17	12	17	6
Barium - ppni	5,300	128"	93.3	154 [a]	149 [a]
Beryllium - ppni	0 14	0 0888 J	0.0357 J	0 165 J	ND [0.507]
Calcium - ppm		2.230	2.240	2,990	2,860
Chromium - ppm	30	22 6	17 1	25 3	17.8
Cobalt - ppm	4.600	7 32	6.82	11 2	6.03
Copper - ppm	2.800	36 3	106	30 2	29.2
Iron - ppm		21,000	15.500	21,600	14,800
Lead - ppni	100	21 [a]	I5 [a]	19 [a]	5.2 J
Magnesium - ppin		4.200	3.530	4,160	5,410
Manganese - ppni	3.200	333	267	324	274
Mercury - ppm	290	0 086 I	0.055 J	0048 I	ND [0.1]
Nickel - ppni	1,500	25	20.1	29 1	17.5
Potassium - ppni		1,580	1,290	1,160	1,520
Selenium - ppm	380	0.38 [a] J	0.45 [a] J	0.42 [a] J	0.26 J
Sodium - ppm		188 J	168 J	218 J	208 J
Vanadium - ppm	540	36 2	26.3	31 7	21.4
Zinc - ppm	23,000	58 4 J	96 J	36 7 J	34 J
Other Metals - ppni	NA	ND	ND	ND	ND

Note: This table lists only the detected constituents r the VOC, SVC OCP. and metals analyses

TABLE 26-1 - SUMMARY OF SITE 112 SAMPLE ANALYTICAL RESULTS

(Contir d)

18-21 July 1998 Sample Results

Parameter Tested	Screening Standardt (ppm)	ample ID* a / Depth in Feet 112-010-SO TP-931 S1 0-0 5	112-011-SO TP-931 S2 5-5 5	112-013-SO TP-932 S1 0-0.5	112-014-SO TP-932 S2 5-5.5
rimary Field Screening - ppm	NA	*0 5*	0 9	2	0
econdary Headspace Screening - ppm	NA	*50*	5	600	1
iesel Range Organic Compounds (DRO) - ppm	5,000	13	ND [8 3]	420	ND [8.2]
esidual Range Organic Compounds (RRO) - ppm	10,000	360	ND [210]	200	ND [200]
asoline Range Organic Compounds (GRO) - ppm	1,400	ND [6 5]	ND [4]	ND [4 2]	ND [5.4]
olatile Organic Compounds (VOC) - ppm					
Methylene Chloride - ppm	2 1	0 057 J	0.23 J	0.013 J	0.062 J
Toluene - ppm	437	ND [013]	0 24 J	ND [0 27]	ND [0.15]
Other VOCs - ppni		ND	ND	ND	ND
emivolatile Organic Compounds (SVOC) - ppm					
Benzoic acid - ppm	43,600	0 76 J	0.6 J	0 54 J	0.55 J
Other SVOCs - ppm	NA	ND	ND	ND	ND
kganochlorinated Pesticides (OCP) - ppm					
4,4'-DDD - ppm	1.9	0 0023	ND [0 00071	ND [0 0008]	ND [0.0007]
4,4'-DDE - ppni	1.3	0 001	0 0002 J	ND [0 0008]	ND [0.0007]
4,4'-DDT - ppm	1.3	0 0082	ND [0 00071	0 048	ND [0.0007]
Endosulfan I - pprn	390	ND [00008]	ND [0 00071	0 012	ND [0.0007]
Endosulfan II - ppm	390	ND [0 0008]	ND [0 00071	0 026	ND [0.0007]
alpha-BHC - ppm	0 071	ND [0 0008]	ND [0 00071	ND [00008]	*0.0005* J
beta-BHC - ppm	0 25	ND [0 0008]	ND [0 00071	0 0024 J	ND [0.0007]
gamma-BHC - ppm	0 34	0 0003 J	ND [0 00071	0002 I	ND [0.0007]
Other OCPs - ppm	NA	ND	ND	ND	ND
olychlorinated Biphenyls (PCB) - ppm	NA	ND	ND	ND	ND
otal Metals - ppm					
Aluminum - ppm	77,000	20.000	5.460	21,400	3.590
Antimony - ppm	31	1 J	041 I	0.94 I	0.68 J
Arsenic - ppm	22 6	**23** [3,4]	5 9	**30** [3,4]	6
Barium - ppm	5,300	136 [a]	48	160 [a]	41.8
Beryllium - ppni	*0* 14	0 127 J	0024 I	0219 I	ND [0.51]
Calcium - ppm		2.030	2.210	1,460	1,360
Chromium - ppm	30	***35.9*** [3]	8 04	**36.6** [3]	10
Cobalt - ppm	4,600	18 I	5 37	16 1	4.76 J
Copper - ppm	2,800	30 5	19 2	32 3	16
Iron - ppm		32,100	10.300	32.700	8,100
Lead - pprn	100	I2	*5 6* I	13 [a]	ND [10]
Magnesium - ppm		6,840	2.950	6,210	2,130
Manganese - ppiii	3,200	524	234	488	189
Mercury - ppm	290	0 052 J	ND *[0* 1	0054 I	ND [0.1]
Nickel - ppm	1,500	38	14 I	35 I	11.8
Potassium - ppm		2,290	677	1,850	611
Selenium - ppm	380	0.39 [a] J	0 25 J	0.57 [a] J	0.3 J
Sodium - ppm		151 J	202 I	127 J	97.7 J
Vanadium - ppiii	540	53 ***5***	14 1	52 4	11.6
Zinc - ppni	23,000	46 3 J	25 J	546 I	37 3 J
Other Metals - ppiii	NA	ND	ND	ND	ND

Iote This table lists only the detected constituents for the VOC, SVOC. OCP. and metals analyses
Full analytical reports, including laboratory RLs, are contained in Appendix F

TABLE 26-1 - SUMMARY OF SITE 112 SAMPLE ANALYTICAL RESULTS
(Continued)

18-21 July 1998 Sample Results		Sample ID* and Depth in Feet			
Parameter Tested	Screening Standardt (ppm)	112-015-SO TP-933 S1 0-0 5	112-016-SO TP-933 s 2 5-5.5	112-017-SO TP-934 S1 0-0.5	112-018-SO TP-934 S2 5-5.5
			0	0	0.1
Secondary Headspace Screening - ppni	NA	1	I	1	400
Diesel Range Organic Compounds (DRO) - ppm	5,000	15	ND [8.2]	150	ND [8.2]
Residual Range Organic Compounds (RRO) - ppm	10,000	230	ND [200]	1,600	ND [210]
Gasoline Range Organic Compounds (GRO) - ppm	1,400	6 3J	ND [5.5]	ND [8.5]	ND [4.8]
Volatile Organic Compounds (VOC) - ppm					
Methylene Chloride - ppm	2.1	0.071 J	0.046 J	0.24	N D [0.12]
Toluene - ppm	437	ND [0.21]	ND [0.14]	0.027 J	ND [0.12]
Xylenes - ppm	320	ND [0.64]	ND [0.40]	0.072 J	ND [0.35]
Other VOCs - ppm	NA	ND	ND	ND	ND
Semivolatile Organic Compounds (SVOC) - ppm					
2-Methylnaphthalene - ppm		ND [0.18]	ND [0.17]	0.15 J	ND [0.17]
Benzoic acid - pprn	43.600	0.85 J	0.73 J	0.81 J	200 J
Chrysene - ppm	2	ND [0.18]	ND [0.17]	ND [0.20]	ND [0.17]
Naphthalene - ppm	240	ND [0.18]	ND [0.17]	0.074 J	ND [0.17]
Phenanthrene - ppm		ND [0.18]	ND [0.17]	0.088 J	ND [0.17]
Pyrene - ppm	100	ND [0.18]	ND [0.17]	0.023 J	ND [0 17]
bis-(2-ethylhexyl)phthalate - ppm	32	ND [0.18]	ND [0.17]	ND [0.20]	ND [0 17]
Other SVOCs - ppm	NA	ND	ND	ND	ND
Organochlorinated Pesticides (OCP) - ppm					
4,4'-DDD - ppni	1 9	0.015	0.0004 J	0.034	ND [0 00071
4,4'-DDE - ppm	1.3	0.037	0.0003 J	0.0058	ND [0 0007]
4,4'-DDT - ppm	1.3	0.068	0 0025	0.2	ND [0 00071
Other OCPs - ppm	NA	ND	ND	ND	ND
Polychlorinated Biphenyls (PCB) - ppm	NA	ND	ND	ND	ND
Total Metals - ppm					
Aluminum - ppm	77,000	6,790	6,670	14,700	7,720
Antimony - ppni	31	0 72 J	2 2	2.7	0.94 J
Arsenic - ppni	22.6	8 3	5 2	17	4.9
Barium - ppm	5,300	96 4	80 3	222 [a]	84.1
Beryllium - ppni	0.14	ND [0 534]	ND [0 512]	0.17 J	ND [0.513]
Calcium - ppni		1.660	2,270	4,060	2.690
Chiomium - ppni	30	13 3	14 1	25.8	10.7
Cobalt - ppm	4,600	6 17	8 56	7.78	6 76
Copper - ppm	2,800	21 7	24 1	55.3	18.2
Iron - ppni		11.300	11,600	20,500	13,200
Lead - ppm	100	11 [a]	7 6 1	**210** [1]	ND [10]
Magnesium - ppm		2,800	3,430	3,780	3.490
Manganese - ppni	3,200	243	223	311	286
Mercury - ppni	290	0 039 J	0035 J	0.066 J	ND [0.1]
Nickel - ppm	1,500	15 6	14 4	22.6	13.7
Potassium - ppm		1.250	1,240	1,550	1,970
Selenium - ppni	380	0 20 J	ND [51]	0.53 [a] J	ND [0.51]
Sodium - ppni		144 J	260J	260 J	134 J
Vanadium - ppni	540	19 2	22 4	34.3	19.7
Zinc - ppm	23.000	24 8 J	31 5 J	90 8 J	32.3 J
Other Metals - ppm	NA	ND	ND	ND	ND

Note: This table lists only the detected constituent or the VOC, SVC , OCP, and n tals analyses
Full analytical reports, including laboratory Ls, are contained i Appendix F

TABLE **26-1** - SUMMARY OF SITE 112 SAMPLE ANALYTICAL RESULTS

(Contir d)

18-21 July 1998 Sample **Results**

Parameter Tested	Screening Standardt (ppm)	ample ID* a 112-019-SO TP-935 S1 0-0 5	I Depth in Feet 112-020-SO TP-935 S2 5-5 5	112-021-SO TP-936 S1 0-0 5	112-022-so TP-936 S2 5-5.5
'rimary Field Screening - ppm	NA	0 2	0 3	2	2
;econdary Headspace Screening - ppm	NA	40	1	30	20
)iesel Range Organic Compounds (DRO) - ppm	5,000	210 J	100	1,800	170
tesidual Range Organic Compounds (RRO) - ppm	10,000	9,800	3,000	2,700	2.000
)asoline Range Organic Compounds (GRO) - ppm	1,400	ND [7 3]	ND [5 4]	ND [7 6]	ND [6.1]
'olatile Organic Compounds (VOC) - ppm					
Toluene - ppm	437	0011 J	ND [0 16]	ND [0 19]	ND [0.13]
Other VOCs - ppm	NA	ND	ND	ND	ND
emivolatile Organic Compounds (SVOC) - ppm					
Benzoic acid - ppm	43.600	1.8 J	0 66 J	2 7 5	1.4J
Chrysene - ppm	2	0 7 3 3	0.13 J	0 042 J	ND [0.17]
Pyrene - ppm	100	0 3 9 3	ND [0 90]	ND [0 17]	ND [0.17]
bis-(2-ethylhexyl)phthalate - ppm	32	ND [1 8]	ND [0 90]	0 22	0.066 J
Other SVOCs - ppm	NA	ND	ND	ND	ND
hganochlorinated Pesticides (OCP) - ppm					
4,4'-DDD - ppm	1.9	0 19	0 051	0 12	0.12
4,4'-DDE - ppm	1.3	**4.1**	0 1	0 27	0 076
4,4'-DDT - ppm	1 3	0 13	0 1	0 39	0.42
Endosulfan I - ppm	390	ND [0 0007]	ND [0 00071	0 06	0.0081
Endosulfan II - ppm	390	ND [0 00071	ND [0 00071	0 0016	ND [0.0007]
alpha-BHC - ppm	0 071	ND [0 00071	ND [0 00071	0 0035	0.0021
Other OCPs - ppm	NA	ND	ND	ND	ND
'olychlorinated Biphenyls (PCB) - ppm	NA	ND	ND	ND	ND
otal Metals - ppm					
Aluminum - ppm	77,000	11.200	10.600	7,770	6,400
Antimony - ppin	31	1.8	0 87 J	0 52 J	0.7 J
Arsenic - ppm	22 6	15	8 7	I2	6
Barium - ppm	5,300	125	89 I	117	64.2
Beryllium - ppm	0 14	0 0366 J	0 0353 J	0 0659	0.0344 J
Calcium - ppm		2,360	3.660	2,030	2380
Chromium - ppm	30	20 7	18 2	14 5	12.6
Cobalt - ppm	4,600	9 41	7 2	6 64	5.09 J
Copper - ppm	2.800	36	26 8	27 8	16
Iron - ppm		17,900	17,200	14,900	10900
Lead - ppm	100	**120**	21 [a]	21 [a]	18
Magnesium - ppni		3,840	4 090	3,380	3030
Manganese - ppm	3.200	250	321	357	243
Nickel - ppni	1.500	21 2	22 I	16 8	13 4
Potassium - ppm		1,620	1.370	919	974
Selenium - ppm	380	0.4 [a] J	0 3 3 I	0 3 1 J	ND [0.51]
Sodium - ppm		198 J	293 I	133 1	152 J
Vanadium - ppm	540	31 9	30 8	22 1	18.9
Zinc - ppm	23,000	67 1 J	31 8 I	40 9 J	22 9 J
Other Metals - ppm	NA	ND	ND	ND	ND

dote This table lists only the detected constituents r the VOC. SVC OCP, and metals analyses
Full analytical reports, including laboratory RLs, are contained in Appendix F

TABLE 26-1 - SUMMARY OF SITE 112 SAMPLE ANALYTICAL RESULTS
(Continued)

18-21 July 1998 Sample Results		ample ID* a	l Depth in Feet		
	Screening Standardt	112-001-so AP-937 SI	112-002-so AP-937 S3	112-003-SO AP-937 S6	112-024-SO AP-938 S1
Parameter Tested	(ppm)	5-6 5	15-16 5	33-35	10-11.5
rimary Field Screening - ppm	NA	1.1	0 8	0 4	0.4
econdary Headspace Screening - ppm	NA	5	5	I	5
iesel Range Organic Compounds (DRO) - ppm	5,000	ND [4 1]	ND [4 1]	ND [4 1]	
esidual Range Organic Compounds (RRO) - ppm	10,000	ND [100]	ND [100]	ND [100]	
asoline Range Organic Compounds (GRO) - ppm	1,400	ND [3 1]	ND [3 3]	ND [3 8]	
olatile Organic Compounds (VOC) - ppm					
Methylene Chloride - ppm	2 1	0 029 J	0 025 J	0.013 J	
Other VOCs - ppm	NA	ND	ND	ND	
emivolatile Organic Compounds (SVOC) - ppm	NA	ND	ND	ND	
lrganochlorinated Pesticides (OCP) - ppm					
4,4'-DDD - ppm	1.9	00013	ND [0 00071	ND [0 0007]	0.025
4,4'-DDE - ppm	1.3	0 0002 J	0 0001 J	ND [0 00071	0.010 J
4,4'-DDT - ppm	1.3	0 006	ND [0 00071	ND [0 00071	0.31
Other OCPs - ppm	NA	ND	ND	ND	ND
olychlorinated Biphenyls (PCB) - ppm	NA	ND	ND	ND	
otal Metals - ppm					
Aluminum - ppm	77,000	6.300	7,120	5,790	
Antimony - ppm	31	0 68 J	0 35 J	0 58 J	
Arsenic - ppm	22 6	4 7	4 1	6 9	
Barium - ppm	5,300	94 8	76 4	64 7	
Beryllium - ppm	0 14	ND [0 508]	ND [0 51]	ND [0 51]	
Calcium - ppm		2.020	5,990	4,200	
Chromium - ppm	30	11 6	16 4	20 6	
Cobalt - ppm	4,600	I 53 5	5 92	381 J	
Copper - ppm	2,800	17 3	20 1	28 7	
Iron - ppm		11.500	12,400	12,700	
Lead - ppm	100	5 3 I	ND [10]	9.5 J	
Magnesium - ppm		3.590	3.700	2,790	
Manganese - ppm	3,200	276	233	273	
Mercury - ppm	290	ND [0 1]	ND [0 1]	ND [0 1	
Nickel - ppm	1,500	13 6	14 6	18 2	
Potassium - ppm		756	1.190	1,100	
Selenium - ppm	380	ND [0 51]	ND [0 51]	0.44 [a] J	
Sodium - ppm		2195	210 I	1575	
Vanadium - ppm	540	19.4	22 8	16 5	
Zinc - ppm	23,000	21.3 J	24 6 J	23 9 J	
Other Metals - ppm	NA	ND	ND	ND	

lote This table lists only the detected constituents r the VOC, OCl ind metals an /ses
Full analytical ieports, including laboratory RLs, are contained in Appendix F

TABLE 26-1 - SUMMARY OF SITE 112 SAMPLE ANALYTICAL RESULTS

(Continued)

18-21 July and 10 September 1998 Sample Results

Parameter Tested	Screening Standard† (ppm)	Sample ID* and Depth in Feet: 112-025-SO AP-939 S1 0-2	112-026QC-SO AP-939 S1** 0-2	12-030QA-SO AP-939 S1** 0-2	112-027-SO AP-939 S3 10-11 5	112-028-SO AP-940 S1 0-2	112-029-SO AP-940 S3 5-6.5
Primary Field Screening - ppm	NA	0.8	0 8	0 8	0 3	0.6	0.4
Secondary Headspace Screening - ppm	NA						
Organochlorinated Pesticides (OCP) - ppm							
4,4'-DDD - ppm	1 9	ND [0.010]	ND [0010]	ND [00035]	ND [0010]	0.025	0.003 J
4,4'-DDE - ppm	1.3	0.002 J	0 002 J	ND [00035]	ND [0 010]	0.035	0.003 J
4,4'-DDT - ppm	1.3	0.015	0 014	0 014	ND [0010]	0.84	0.1
Other OCPs - ppm	NA	ND	ND	ND	ND	ND	ND
Arsenic - ppm	22.6	-					
Chromium - ppm	30	-				-	

Note: This table lists only the detected constituents tor the OCP analyses. Full analytical reports, including laboratory RLs, are contained in Appendix F

Parameter Tested	Screening Standardt (ppm)	Sample ID* and Depth in Feet: 112-032-SO SS2 0.5-1	112-033-SO ss3 0.5-1	112-034-SO ss4 0.5-1	112-035-SO SS5 0.5-1	112-036QC-SO SS5** 0.5-1	112-045QA-SO SS5*** 0.5-1
Primary Field Screening - ppm	**NA**						
Secondary Headspace Screening - ppm	NA						
Arsenic - ppm	22.6	22	20	21	**31** [3,4]	**28** [3,4]	21
Chromium - ppm	30	**32.6'**	**31** [3]	23.9	**38.1** [3]	**34.4** [3]	28

TABLE 26-1 - SUMMARY OF SITE 112 SAMPLE ANALYTICAL RESULTS

(Continued)

10 September 1998 Sample Results

Parameter Tested	Screening Standardt (ppm)	Sample ID* and Depth in Feet: 112-039-SO SS8 0.5-1	112-040-SO SS9 0.5-1	12-043-SO SS12 0.5-1	112-044-SO SS13 0 5-1	112-012-MB MB NA	112-023-MB MR NA
Primary Field Screening - ppm	NA			-	-		
Secondary Headspace Screening - ppm	NA			-	-		-
Gasoline Range Organic Compounds (GRO) - ppm	1,400			-	-	ND [10]	ND[10]
Volatile Organic Compounds (VOC) - ppni							
Hexane - ppm	110			-	-	0.034 J	ND [0.25]
Methylene Chloride - ppm	2.1	-		-	-	0.05 J	ND [0.25]
Toluene - ppm	446			-	-	0.034 J	ND [0.25]
Other VOCs - ppm	NA	-		-	-	ND	ND
Arsenic - ppm	22.6	22	26 [4,4,5]	24 [4,4,5]	30 [4,4,5]		-
Chromium - ppm	30	31 [3]	34'	33.1 [3]	39.8 [3]		

Note Full analytical reports, including laboratory Rl

Key

*	Sample Identification (ID) numbers include the USAED designation (top line) and the field loca designation (second line). USAED numbers include the prefix SW98FTG- (not shown).
**	QC sample.
***	QA sample submitted to MAS.
†	Most stringent project screening standard See Table 3-2 for a full list ofproject screening stan
-	Project screening standard not available or sample not analyzed for this parameter.
J	The value reported is less than the laboratory's RL but greater than the laboratory's MDL.
MB	Method Blank
NA	Not Applicable
ND	Non-Detectable, or less than the RL for each remaining constituent. See Appendix F for RL.
ND [x]	Result is non-detectable based on the laboratory reporting limit provided in parentheses.
ppm	parts per million
RL	Reporting limit
	Indicates reported concentration exceeds one or more of the 1998 EI/LRI Screening Standards. Reference explanations below.
I	Concentration may exceed Resource Conservation and Recovery Act (RCRA) standard, as listel 40 CFR Section 261.24.
	Substances Pollution Control Regulations, Cleanup Standards, May 4, 1998.
3	Concentration exceeds EPA Region 9 Residential Soil PRGs.
4	Concentration exceeds EPA Region 9 Industrial Soil PRGs.
a	Reported value is greater than background, but is less than 1998 EI/LRI Screening Standards.

Analytical Methods
GRO by Alaska Method 101
DRO by Alasha Method 102
RRO by Alasha Method 103
Inorganic metals by EPA Method 6010B or 7000 series
OCP by EPA Method 8081A
PCB by EPA hlethod 8082
VOC by EPA hlethod SW8260B modified by Alaska Method 101
SVOC by EPA Method 8270C

OCP constituents detected in the samples include 4,4'-DDD, 4.4'-DDE, 4,4'-DDT, endosulfan I, endosulfan 11, alpha-BHC, beta-BHC, and gamma-BHC. Concentrations of up to 4.7 ppm 4.4'-DDE exceed the EPA Residential PRG. The reported concentrations of 36 ppm 4,4'-DDD and 87 pprn 4,4'-DDT exceed the EPA Residential and Industrial PRGs. Concentrations above PRGs are limited to samples from TP-929/AP-938 to a depth of 4.5 feet bgs, and TP-935 to a depth of 0.5 foot bgs. All reported OCP concentrations are less than the corresponding project specific migration to groundwater screening levels.

Metals were detected in each of the submitted samples. Of the 23 metals, only cadmium, silver, and thallium were not detected. Barium and selenium concentrations exceed background concentrations by up to a factor of 1.48 and 1.73, respectively; however, the concentrations are below risk-based screening standards. The arsenic concentrations in six surface samples exceed both PRGs and the maximum background concentration measured in 1997. The chromium concentrations in eleven samples exceed both the EPA Residential PRG and the maximum background concentration. With the exception of one sample at 5 feet bgs in TP-928, the chromium exceedances were limited to surface samples. The elevated arsenic and chromium concentrations were generally limited to samples collected in the vicinity of Test Pits TP-931 and TP-932. All reported metal concentrations are less than the corresponding project-specific migration to groundwater screening levels.

Two lead results, from surface samples at Test Pits TP-934 and TP-935, had concentrations that are less than PRGs, but may exceed the RCRA standard for TCLP lead, based on the "20 times" dilution rule. If soil from these locations is disposed of, testing for TCLP lead would be required to establish whether the soil would have to be handled as hazardous waste.

Assessment of the metals data is based in part on the 1997 background sample results. The highest arsenic and chromium concentrations measured in the Site 112 samples are 31 ppm and 50.4 ppm, respectively. These compare to maximum background arsenic and chromium concentrations of 22.6 ppm and 28.5 ppm, respectively, measured in 1997. As discussed in Section 5.0, the 1997 background measurements may not reflect the full range of naturally occurring concentrations, and do not quantify all metals evaluated in the 1998 EVLRI. A

comprehensive background sampling program is proposed to obtain a more complete and statistically valid set of background metal and dioxidfuran data. If the proposed program verifies a larger range of background concentrations, the project screening standards will be modified in accordance with the approach outlined in Section 3.3.1. The updated background concentrations will subsequently be used to reassess the results of Site 112 metals analyses. In particular, the site's arsenic and chromium data will be compared to the revised screening standards to determine if the measured concentrations may reasonably be attributed to naturally occurring levels.

26.5 ENGINEERING EVALUATION

The Engineering Evaluation incorporates field observations and data assessment results to characterize the site's soil, identify the presence and extent of impacted soil, and evaluate future action alternatives. A determination of data completeness is also conducted during this effort.

26.5.1 Soil Description

Soil boring logs and test pit logs are included as Figures B-78 through B-90 in Appendix B. Soils encountered were in general accordance with Table 2-1, Typical Subsurface Soil Conditions at Fort Greely, Alaska.

26.5.2 Impacted Soil

Based on the data assessment, Site 112 is impacted by OCP and metals concentrations that exceed the project screening standards listed in Table 3-2. UXO may also be present in the surface and subsurface soil.

OCP-Impacted Soil

Three OCP constituents exceed project screening standards. Concentrations of 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT exceed one or more of the risk-based standards. The OCP exceedances are limited to samples from TP-929/AP-938 collected at depths between 0.5 foot

to 4.5 feet bgs, and from TP-935 at 0.5 foot bgs. The vertical extent of OCP contamination was delineated by AP-938. Based on sampling at other test pit and soil boring locations, the lateral extent around TP-929 also appears to be delineated. Because the area to the east of TP-929 is outside the former salvage yard boundary, it was believed to be a less likely source location than the soils within the yard, and was therefore not directly evaluated. The lateral extent of OCP contamination in the trench area surrounding TP-935 was not defined, although the TP-936 sample results demonstrate that contaminant is not widespread in this area.

In summary, the 1998 LRI data indicate that OCP contamination occurs in discrete regions across the site. These localized areas appear to extend to a maximum depth of about six feet bgs. Since the soil from the LRI test pit excavations has been placed in super sacks, the impacted soil in these areas has likely been removed. Because the source(s) of OCP contamination at the sits has not been verified, there is no justification for the assumption that all impacted areas were identified during the 1998 LRI field effort.

Metals-Impacted Soil

Site 112 also appears to have been impacted by arsenic, chromium, and potentially lead. The arsenic and chromium exceedances were primarily in surface samples in the vicinity of Test Pits TP-931 and TP-932. Six of the ten surface samples collected in the southern half of Site 112 contained arsenic concentrations that exceed the maximum background concentration and one or more risk-based standards. Chromium concentrations in nine of the ten surface samples exceed the EPA Residential PRG and background concentrations. The only subsurface sample that contained an elevated chromium concentration was collected from TP-928 at 5 feet bgs. Two lead results from surface samples at Test Pits TP-934 and TP-935 had concentrations that may exceed the RCRA standard for TCLP lead, based on the "20 times" dilution rule. The consistent presence of elevated metals at this site may be the result of naturally occurring metals, anthropogenic sources, or both. Site observations that support both interpretations are discussed in the following paragraphs.

The pattern of arsenic and chromium concentrations across the site is not random, suggesting that the elevated concentrations are associated with metal debris or other discrete sources. The average arsenic concentration for the surface samples in the vicinity of Test Pits TP-931 and TP-932 is 28 ppm, whereas the average for all Site 112 surface samples is 23 ppm, and the average concentration for all Site 112 samples is 15.7 ppm. The average chromium concentration for the surface samples in the vicinity of Test Pits TP-931 and TP-932 is 33.1 ppm; whereas, the average for the Site 112 surface samples is 29 ppm, and the average chromium concentration from all Site 112 samples is 23.5 ppm. These patterns indicate that surficial arsenic and chromium concentrations are elevated, particularly in the vicinity of Test Pits TP-931 and TP-932.

It is also possible that the observed concentration distribution is associated with localized variations in background concentrations, or reflects uneven weathering processes across the site. Weathering processes on finer-grained soil are likely to release a higher concentration of metals from the parent material because of the greater surface area, relative to coarser material. The consistent presence of higher metals concentrations within one foot of the surface, where greater weathering of the finer-grained soil is encountered, was observed at Site 112.

The source of apparently elevated metals concentrations may be clarified by the proposed background sampling program. The updated background concentrations may also change the screening standards used to assess arsenic and chromium data. Specifically, consider that the maximum arsenic background concentration measured in 1997 exceeds the corresponding risk-based screening standards. In accordance with the process described in Section 3.3.1, the background concentration effectively becomes the screening standard for this circumstance. Establishing a greater range of background concentrations may therefore increase the arsenic screening standard.

To resolve these issues, the presence and extent of metals-impacted soil will be reassessed following completion of the comprehensive background sampling program.

Presence of UXO

UXO may be present at Site 112. Although UXO was not positively identified during UXO and geophysical surveys, a large quantity of UXO-related scrap was encountered at the surface and in subsurface soil. These observations indicate that UXO not identified by the surveys may be located throughout the site.

26.5.3 Future Action Alternatives

Based on criteria presented in Section ***3***, Site 112 is not eligible for NFA. The future action strategy for this site should address localized areas of OCP contamination and apparent elevated surficial metal concentrations.

Future action alternatives that were considered for Site 112 include natural attenuation, bioventing, VES, excavation, **risk** analyses, and capping. The alternatives were evaluated using a qualitative assessment of remedial effectiveness, technical feasibility, and cost. Because metals and OCP are nonvolatile and generally resistant to biodegradation, natural attenuation, bioventing, and VES were considered ineffective remedial actions. Similarly, limited scope risk analysis is inappropriate as the primary action due to potentially complete exposure pathways in the surface soil.

The contaminated soil generally does not appear to extend deeper than 1 foot bgs for metals and 10 feet bgs for OCPs. For these conditions, selective excavation, risk assessment, and/or capping are likely technically appropriate future actions for both COPCs. Selection between these alternatives should be based on the volume of potentially impacted soil and maximum concentrations. This assessment is limited, however, by data gaps regarding background metal concentrations, the lateral extent of potential metals contamination, and the number and location of OCP-contaminated areas.

For small volumes of impacted soil, selective excavation is appropriate. If excavation is conducted, impacted soil must be treated or disposed of in accordance with applicable regulations. Different excavation strategies may be required for the metal and OCP

constituents. For metals, a phased approach is recommended. This strategy incorporates selective excavation in the areas known to contain metals concentrations that exceed screening standards. Soil samples collected from the excavation base and sidewalls would be used to direct additional excavation work and/or to reassess whether risk assessment should be initiated. It is emphasized that the need to conduct future action for elevated metals concentrations will be re-evaluated following completion of the comprehensive background sampling program. **A** statistically-based approach will be used to determine whether the concentrations measured at Site 112 are representative of naturally occurring levels.

A removal action for OPC-impacted soil could be implemented using two distinct approaches. First, surface soil from across the site can be removed to a uniform depth of three feet bgs, and replaced with a cap. Because OCP-impacted soil may be present throughout the former salvage yard and the former trench to the north, this uniform excavation would encompass an estimated area of about 3.5 acres. The removed soil would have to be characterized for disposal, due to its potential hazardous nature. Furthermore, this method would likely require risk analysis and/or IC to address the underlying soils that are not removed. The primary advantage of this excavation method is that it facilitates completion of the remedial action in a single field season.

The second excavation option for OCP-impacted material is additional data collection, followed by selective excavation. The additional data would likely consist of surface samples collected from a grid established at the former salvage yard and adjacent trench. Excavation would then be limited to removing soil to 10 feet bgs at discrete areas identified by the sampling effort. This method reduces the volume of potentially hazardous waste generated, relative to the excavation effort described above, and is anticipated to achieve site closure with no future use restrictions.

Comprehensive risk assessment may be considered as an alternative to excavation. This method would use representative Fort Greely data to determine the need for additional remediation and/or to calculate parcel-specific ACLs. The cost effectiveness of comprehensive risk assessment is directly proportional to the volume of impacted soil.

Drawbacks include the potential need for remedial action after the risk assessment is completed, and potential IC restrictions to future land use.

The third future action strategy considered for Site 112 is capping. More precisely, a cover would be more appropriate for the large area encompassed by the former salvage yard. This strategy entails placement of soil over the site surface as a means to reduce exposure through ingestion, inhalation, and dermal exposure. **A** limited scope risk analysis would also be conducted to verify the effectiveness of the cover at reducing surface exposure, and to evaluate the migration to groundwater exposure pathway. The primary advantage of this strategy is its cost effectiveness, provided that sufficient cover material can be provided at a nominal cost. This approach also requires no additional characterization sampling, can be implemented in a single field season, and does not depend on resolution of the metal background issue. Conversely, this approach will likely entail an IC land use restriction, and is not cost-effective if it can be demonstrated that OCP and metals contamination is limited to the areas already identified.

26.5.4 Data Completeness

The 1998 LRI data from Site 112 indicate the type of contamination and vertical extent of impacted soil. Several data gaps are identified, as additional characterization would be needed to: 1) verify the lateral extent of surficial arsenic and chromium contamination, 2) determine whether the metals concentrations are indicative of former usage or background concentrations, and 3) fully assess the presence and extent of OCP-contaminated soil at the site.

The data are also insufficient to verify the absence of UXO. Conventional clearing and monitoring practices conducted during the LRI did not reveal UXO. However, the prevalence of other scrap metal indicates that undetected UXO may remain onsite. The impact of potential UXO on parcel transfer suitability has not been determined.

The existing information is sufficient to develop a preliminary future action strategy. Implementation of the recommended action does not require that the data gaps be filled. Even so, the preliminary recommendation is intended for budgetary purposes, and may need to be revised as additional information is obtained.

26.6 RECOMMENDATIONS

Based on the LRI results, COPC concentrations in the surface soil exceed screening standards, and additional action is recommended to protect human health and the environment. The recommended future action strategy and associated costs are discussed in the following subsections.

26.6.1 Technical Recommendation

The preliminary recommendation for Site **112** consists of separate future action strategies to address soil impacted by metals and by OCPs. Both strategies presented below may be further evaluated in an FFS. The recommendation does not explicitly address potential UXO. If necessary, a future action strategy will be developed for UXO. At a minimum, future land owners should be informed regarding the UXO-related scrap discovered at the site, the potential exposure risks during earthwork, and recommended monitoring practices.

The recommendations for this site do no include provisions for groundwater monitoring. The potential impact of Site 112 or the underlying groundwater table will be evaluated using the proposed groundwater monitoring wells at Landfills 1 and 2. Installation of these wells is not part of the LRI program.

Metals-Impacted Soil

No further action is recommended to address elevated metals concentrations, based on the assumption that the arsenic and chromium levels measured at the site are naturally occurring. This assumption will be evaluated using a proposed post-wide background sampling program. If this program confirms that a higher arsenic and chromium background screening standard is

appropriate, as anticipated, then additional action for metals may not be needed to ensure protection of human health and the environment. Even if the assumption is not verified, the proposed action strategy for OCP contamination is also sufficient to address metals.

OCP-Impacted Soil

The future action strategy for addressing OCP-impacted soil consists of three components. First, a soil cover will be used to eliminate exposure pathways through the surface soil. The cover will consist of 3 feet of clean soil placed over the area encompassed by the former salvage yard. In addition, clean soil will be placed in the trench located directly north of the former salvage yard. Second, transport modeling will be used to evaluate exposure pathways for the in-place COPCs. Third, an IC land use restriction will be used to prevent future exposure to the covered surface soil.

IDW Disposal

The IDW waste remaining on site and at the Ft. Greely laydown yard should be disposed of as follows:

- **A** total of 7 super sacks of soil from Test Pits TP-929 and TP-935 and drill cuttings from AP-938 should be disposed of as hazardous waste, due to elevated OCP concentrations in both, and potential lead contamination in one.
- The six super sacks of soil from TP-934 may also contain a lead concentration that exceeds RCRA disposal criteria. **A** composite sample from the six super sacks should be tested for TCLP lead to determine disposal requirements.
- Soil from Test Pits TP-928, TP-931, TP-932, and Boring AP-937, if it has not already been landspread, should be retained until the metals issue is resolved. Based on this resolution, this soil will either be landspread or placed in the active Ft. Greely landfill.

26.6.2 Cost Estimate

The ROM cost estimate for Site 112 is based on the following assumptions:

Additional Data Collection

- No additional data collection is recommended.

Future Action Assumptions

- The southern half of the former salvage yard, approximately 1.3 acres, will be cleared of brush and trees.
- Approximately 12,800 cubic yards (19,200 tons) of soil will be used to cover the former salvage yard. An additional 1,500 cubic yards (2,300 tons) will be imported to fill the trench area.
- The cover material will be available at no net cost to the contractor. This assumption is based on obtaining Jarvis Creek borrow permit modifications or identifying an alternative borrow source.
- Equipment requirements include a loader at the borrow site, trucks to transport the cover material, a loader at the fill site, and a grader to place, compact, and grade the cover material.
- The cost for a loader at the borrow site also includes time to load fill for the other Fort Greely EI/LRI parcels. This cost is presented as a single value to reflect the assumed economies of scale that will be realized by conducting removal actions during the same field season.
- Cover placement, compaction, and grading will require 30 days to complete.
- Equipment mobilization and demobilization costs are not included.
- Limited scope risk analyses, consisting of contaminant fate and transport modeling will be conducted to evaluate exposure pathways.

IDW Disposal

- IDW waste will be disposed of in accordance with the technical recommendations in Section 26.6.1.

Documentation

- Anticipated documents consist of an FFS or EE/CA, future action work plan, remediation report, and decision document.

Estimated Cost

The ROM estimated cost is summarized in Table 26-2. A detailed breakdown of this estimate is provided in Appendix D. The line item costs listed below may vary from the Appendix D values, due to inclusion of project management expenses in the individual tasks.

Table 26-2 Site 112 Cost Estimate Summary

Cost Estimate Item	cost
IDW Disposal	$59,600
Capping	$143,000
Risk Analysis	$147,500
Documentation (excluding the risk analysis report, which is contained in the **risk** analysis cost line item)	$30,400
Borrow Area Equipment Operation (inclusive for all sites)	$21,700
Total	**$402,000**